

★ **Cloud Computing**

Module 1: Introduction to Cloud Computing

- What is Cloud Computing?
 - History & evolution of cloud
 - Why the world is moving to cloud
 - Traditional vs Cloud Infrastructure
 - Benefits of Cloud: Scalability, Elasticity, Reliability, Security
 - CAPEX vs OPEX model
 - Cloud adoption in companies (real-world examples)
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Module 2: Cloud Computing Service Models

- IaaS (Infrastructure as a Service)
 - PaaS (Platform as a Service)
 - SaaS (Software as a Service)
 - FaaS / Serverless Computing
 - Differences between IaaS, PaaS, SaaS
 - Real-world examples of each model
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Module 3: Cloud Deployment Models

- Public Cloud
 - Private Cloud
 - Hybrid Cloud
 - Community Cloud
 - Multi-Cloud Strategy
 - **Edge Computing**
 - Use cases of each model
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Module 4: Virtualization Fundamentals

- What is Virtualization?
 - Virtual Machines
 - Hypervisors (Type 1 & Type 2)
 - Containers vs Virtual Machines
 - Cloud Virtualization Technologies (VMware, KVM, Hyper-V, Xen)
 - Demo: Creating a VM using VirtualBox
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Module 5: Cloud Architecture Components

- Compute
 - Storage
 - Network
 - Load Balancing
 - Auto Scaling
 - CDN (Content Delivery Network)
 - DNS
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- Cloud Monitoring
 - Cloud Backup & Disaster Recovery
 - Shared Responsibility Model
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Module 6: Cloud Networking Basics

- What is Virtual Private Cloud (VPC)?
 - Subnets (Public & Private)
 - IP Addressing: IPv4, CIDR
 - Routing Tables
 - Internet Gateway & NAT Gateway
 - Firewalls & Security Groups
 - VPN & Direct Connect basics
 - Zero Trust Networking (modern concept)
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Module 7: Cloud Storage Services

- Block Storage
 - Object Storage
 - File Storage
 - Backup & Archival Storage
 - Storage Lifecycle Policies
 - RAID concepts
 - Demo using MinIO (open-source S3 alternative)
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Module 8: Identity & Access Management (IAM)

- What is IAM?
 - Users, Roles, Groups, Policies
 - Authentication vs Authorization
 - Multi-Factor Authentication (MFA)
 - Least Privilege Concept
 - Single Sign-On (SSO)
 - OAuth2, OpenID Connect basics
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Module 9: Cloud Security

- Cloud Security Fundamentals
 - Firewalls, WAF, DDoS Protection
 - Encryption:
 - Data at rest
 - Data in transit
 - Key Management Systems (KMS)
 - Security Threats in Cloud
 - Cloud Compliance Standards:
 - ISO 27001
 - SOC2
 - GDPR
 - HIPAA
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■ **Module 10: Cloud Automation & Infrastructure as Code (IaC)**

- What is IaC?
 - Benefits of IaC
 - Introduction to Terraform
 - Introduction to Ansible
 - Cloud Automation concepts
 - Hands-on demo with Terraform (optional)
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■ **Module 11: Cloud Containers & Serverless Containers**

- What is Containerization?
- Docker Basics
- Container Orchestration Overview (Kubernetes basics)

Serverless

- Serverless compute concept
 - Event-driven architecture
 - Use cases of serverless
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■ **Module 12: Cloud Platforms Overview**

- AWS overview
 - Azure overview
 - Google Cloud overview
 - Comparison of services across providers
 - Pricing model & cloud billing basics
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■ **Module 13: Cloud Monitoring & Logging**

- Why monitoring is important
 - Logs, Metrics, Alerts
 - Application Performance Monitoring (APM)
 - Tools overview:
 - Prometheus
 - Grafana
 - ELK Stack
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■ **Module 14: Cloud Migration & Design Principles**

- On-premises to cloud migration strategies:
 - Rehost
 - Replatform
 - Refactor
 - Retire
 - Retain
 - 12-Factor App Principles
 - High Availability Architecture
 - Fault Tolerance Design
 - Cost Optimization Techniques
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■ **Module 15: Real-World Use Cases & Case Studies**

- Netflix Cloud Architecture
 - Airbnb Cloud Infrastructure
 - Instagram Scaling Strategy
 - Banking Cloud Infrastructure
 - E-commerce Cloud Architecture
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★ **Resources**

- Cloud Computing Notes
 - Mini Projects:
 - Launching VMs
 - Setting up a virtual network
 - Creating virtual storage
 - Practice Questions
 - Interview Preparation
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